

Cardia Insufficiency: Impaired Motor Function of the Gastrointestinal Tract

Lychkova AE^{1*}, Terentyev AA² and Puzikov AM¹

¹State Medical Institution Moscow Clinical Research Center Named After A. S. Loginov DZM, Moscow, Russia

²Pirogov Russian National Research Medical University, Pirogov Medical University, Moscow, Russia

***Corresponding Author:** Lychkova AE, State Medical Institution Moscow Clinical Research Center Named After A. S. Loginov DZM, Moscow, Russia.

Received: January 14, 2021; **Published:** February 11, 2021

Abstract

Aim of the Study: The aim is electromyographic evaluation of motor function of the upper digestive tract in case of insufficiency of the cardia.

Materials and Methods: 6 women aged 47.2 ± 5.7 years and 6 men aged 44.5 ± 4.6 years were followed up. Motor function of the upper digestive tract was recorded electromyographically. The amplitude-frequency parameters of slow waves and spikes, the power of phase and tonic contractions, and propulsive activity were evaluated using the Conan-M hardware and software complex with a bandwidth of 0, 1 - 10 mv. The comparison group consisted of 10 patients with IBS of painful form. Statistical analysis was performed using the nonparametric Mann-Whitney test.

Results: With cardia insufficiency, there was an increase in the propulsive activity of the stomach in both the antegrade and retrograde directions by more than 1.5 times, as well as hypermotor dyskinesia duodenum. Propulsive activity was 34.2 ± 2.7 (71% increase, $p < 0.05$). With cardia insufficiency, hypermotor dyskinesia of the small intestine is observed.

Conclusion: With cardia insufficiency, there is a significant increase in the propulsive activity of the upper parts of the digestive tract - the stomach and duodenum - with a subsequent progressive decrease in the jejunum. Motor function is regulated by the interaction of the extra-organ nervous system and the intramural nerve plexus. Violation of the balance of excitatory and inhibitory processes occurs with pathologically high contractile activity of the gastrointestinal tract. Cardia insufficiency develops in hypermotor dyskinesia of the stomach, both in the antegrade and in the retrograde direction.

Keywords: Cardia Insufficiency; Motor Function of the Upper Digestive Tract; Electromyography

Introduction

Cardia insufficiency (halasia of the cardia) is a syndrome that occurs in connection with a violation of the locking of the cardia (esophageal-gastric junction). It occurs very often (from 20 to 70% of the adult population). The need for early diagnosis and prevention is due to the fact that against the background of cardia insufficiency, such serious esophageal lesions as reflux esophagitis appear with the development of erosions, ulcers, strictures and bleeding [1].

The occurrence of gastro-esophageal reflux is facilitated by a decrease in the tone of the lower esophageal sphincter, organic lesions of its muscle layer, and the lack of complete coverage of the esophagus by the legs of the diaphragm. It is observed in systemic scleroderma due to atrophy of smooth muscle fibers of the cardia zone, in axial hernias of the esophageal orifice of the diaphragm due to displacement of the sphincter into the chest cavity. In peptic ulcer disease, cholelithiasis, there may be a relative (functional) insufficiency of the cardia due to hypertonicity of the stomach, increased intra-abdominal pressure [2].

When performing high-resolution manometry, hypomotor esophageal dyskinesia, ineffective (or weakened) and fragmented peristalsis are diagnosed. Pathogenetic drug treatment is currently not sufficiently developed, but for this group of patients, lifestyle modification is important. The treatment is aimed at reducing the number of refluxes and reducing the time of contact of the esophageal mucosa with reflux.

One of the ways to assess the motor function of the gastrointestinal tract (GI) is electromyography.

Aim of the Study

The aim is electromyographic evaluation of motor function of the upper digestive tract in case of insufficiency of the cardia.

Materials and Methods

6 women aged 47.2 ± 5.7 years and 6 men aged 44.5 ± 4.6 years were followed up. Along with signs of cardia insufficiency, patients showed signs of reflux disease in 75% of cases, chronic cholecystitis, biliary sludge and cholelithiasis in a total of 83.3% of cases, non-alcoholic fatty liver disease, hepatomegaly and hepatic hemangioma in a total of 33.4% of cases.

The motor function of the gastrointestinal tract was recorded electromyographically by applying bipolar silver electrodes to the anterior abdominal wall in the projection area of the organ under study. The amplitude-frequency parameters of slow waves and spikes, the power of phase and tonic contractions, and propulsive activity were evaluated using the Conan-M hardware and software complex with a bandwidth of 0, 1-10 mv. The comparison group consisted of 10 patients with IBS of painful form.

Statistical analysis was performed using the nonparametric Mann-Whitney test ($p < 0,05$).

Results

The frequency of slow gastric waves was $7.1 \pm 0.5/\text{min}$ (increase of 29.1%, $p < 0.05$), the amplitude was 0.12 ± 0.003 mv (decrease of 20%, $p < 0.05$), the power of tonic contractions was 0.852 ± 0.0358 (an increase of 3.2 %, $p > 0.1$). The frequency of spikes was 3.8 ± 0.25 (increase by 280%, $p < 0.001$), the amplitude was 0.01 ± 0.0015 mv (decrease by 90%, $p < 0.05$), the power of phase contractions was 0.038 ± 0.002 (decrease by 62%, $p < 0.05$), the propulsive activity was 22.4 ± 2.1 (increase by 171%, $p < 0.001$). That is, with cardia insufficiency, there was an increase in propulsive activity in both the antegrade and retrograde directions by more than 1.5 times.

Electromyographically, the frequency of slow duodenal waves was $20.7 \pm 1.6/\text{min}$ (decrease by 5.9 %, $p < 0.05$), the amplitude was 0.12 ± 0.004 mv (increase by 20%, $p < 0.05$), the power of tonic contractions was 2.484 ± 0.135 (increase by 14.9%, $p < 0.05$). The frequency of spikes was 3.1 ± 0.3 (increase by 210%, $p < 0.001$), the amplitude was 0.02 ± 0.001 mv (decrease by 80%, $p < 0.05$), the power of phase contractions was 0.062 ± 0.0024 (decrease by 38%. $p < 0.05$), propulsive activity - 40.1 ± 2.3 (increase by 82.2%, $p < 0.05$). That is, when the cardiac insufficiency is observed hypermotor dyskinesia of the duodenum.

In the jejunum, the frequency of slow waves was $18.8 \pm 0.5/\text{min}$ (decrease by 6%, $p < 0.05$), the amplitude was 0.12 ± 0.003 mv (increase by 20%, $p < 0.05$), the power of tonic contractions was $2,256 \pm 0.154$ (increase by 12.8%, $p < 0.05$). The frequency of spikes was 3.3 ± 0.06 (increase by 230%, $p < 0.001$), the amplitude was 0.02 ± 0.003 mv (decrease by 79.9 %, $p < 0.05$), the power of phase contractions was 0.066 ± 0.0024 (decrease by 34%, $p < 0.05$), the propulsive activity was 34.2 ± 2.7 (increase by 71%, $p < 0.05$). That is, when the cardiac insufficiency is observed hypermotor dyskinesia of the duodenum and jejunum of the intestines.

Conclusion

With cardia insufficiency, there is a significant increase in the propulsive activity of the upper parts of the digestive tract - the stomach and duodenum - followed by a progressive decrease in the jejunum and colon, and this decrease is most pronounced in the left parts of the colon, which is clinically expressed by constipation. Motor function is regulated by the interaction of the extra-organ nervous system and the intramural nerve plexus. Violation of the balance of excitatory and inhibitory processes occurs with pathologically high contractile activity of the gastrointestinal tract, or, conversely, with a decrease in the intensity of contraction, which leads to the development of ineffective motor skills. This leads to the development of a symptom complex of hypomotor dyskinesia.

Cardia insufficiency develops in hypermotor dyskinesia of the stomach, both in the antegrade and in the retrograde direction.

Bibliography

1. Kharitonova LA., *et al.* "Achalasia of cardia in a child at the age of 10 months". *Voprosy Detskoi Dietologii* 15.1 (2017): 40-44.
2. Rychagov GP., *et al.* "A method of surgical treatment of gastroesophageal reflux disease". Minsk (2008): 10.

Volume 8 Issue 3 March 2021

© All rights reserved by Lychkova AE., *et al.*